Terms such as QT-Variability or Dynamic QT-Analysis are usually used in different contexts. This raises the necessity to exactly define them for the purposes of this paper. At onset of the research there were a lot of studies publishing results from discontinuous measurement of the QT-interval for example by manual or automatic analysis of hourly strips from Holter registrations. Nowadays it is possible to perform a continuous "dynamic" QT-interval measurement in order to correlate the QT values with the RR values. At present, there are different devices used. Some perform a real beat-to-beat analysis, other systems use averaged QT values over different time windows, e.g. 30 seconds. All systems may calculate rate normalized QT-analysis, the so-called QTc value. This paper will focus on results of studies in which a continuous measurement of the QT-interval was used.

This real dynamic QT-analysis is very interesting with regard to the content of information. Just to mention the possible correlation with simultaneous measurements of the autonomic nervous system to judge its influence on repolarisation. This may offer an insight into the physiology and pathophysiology of repolarisation. Furthermore this method may help us to control therapies, e.g. anti-arrhythmic therapy with influence on repolarisation. On the other hand, there are still a lot of problems, in particular technical problems in performing continuous QT-interval analysis. The basic signal for QT-analysis
derived from Holter recordings is not always suitable for continuous measurement of the QT-interval. Problems such as baseline noise, insufficient quality of T-waves or changing T-waves might occur. Regarding the fact that there is an ongoing discussion about the correct measurement of T-waves (real end of T-wave, U-wave-problem) these open questions are also apparent for automatic QT-interval measurements from long-term recordings.

Another point is the question of the optimal correction formula to judge the relation of QT and heart rate. At present, the formula most frequently used is still the Bazett formula. Nevertheless, there is an active discussion in particular on this formula, because of its inaccuracy, especially in high and low heart rates. Consequently numerous new formulas for heart rate adjustment based on different mathematical models have been published. The question is, which algorithm is optimal to correct the QT and RR ratio with regard to all frequency ranges. Despite the presentations of newer formulas with better fit than the Bazett formula there is still no agreement and no generally accepted formula.

INITIAL CLINICAL STUDIES ON CONTINUOUS “DYNAMIC“ QT MEASUREMENT

First attempts for an automatic measurement of ventricular repolarisation duration were published by Arthur Moss' group in 1989. The computer algorithm of this group which carried out a beat-to-beat analysis of the time intervals between the peaks of the R and T-waves (RTm) was later used for the analysis of Holter ECGs. In combination with the simultaneous measurement of the RR-intervals an evaluation of the dynamic relation between repolarisation and cycle length was possible.

Another group which early described the clinical relevance of assessing QT dynamicity in Holter recordings was the group of Paul Coumel. This group also developed an original computer algorithm for the dynamic QT-interval measurement and linearly correlated the QT and RR values over a time period of 24 hours. The method used was independent from correction formulas. To judge the influence of heart rate and autonomic nervous system on repolarisation changes the group appropriately selected the QRST-complexes according to their environment. Coumel stated that not only the last RR cycle but the mean heart rate over the preceding minutes and the circadian influences must be controlled to differentiate the role of the short- and long-term influences. The study showed that the QT-interval is shorter, and the slope of the QT/RR regression line is steeper at daytime compared to nighttimes. Aging lengthens the QT-interval and reduces the day-to-night differences of QT duration and